10/719,011

adjusts the RF properties of the parasitic components based on some observed metric of the received waveform. This antenna system is referred to as a controlled parasitic antenna (CPA). By using a feedback control subsystem to control the electromagnetic properties of the antenna aperture, this antenna system can provide multifunctionality and / or mitigate problems associated with reception of an interfering signal or signals within a very compact volume.

[0013] In the present invention, by controlling reactive loads or switches attached to a parasitic element collocated with the individual radiating elements within an array or a subarray, the frequency properties of the array can be controlled and the scan angles can be increased. This approach holds promise for overcoming many of the limitations of current phased arrays.

[0014] One way of increasing the coverage of the array is by the use of reconfigurable elements. Such elements make use of one or more active control devices embedded in the aperture (specifically in parasitic elements in the aperture) of the individual radiating elements within the array. The impedance of the control device or devices would depend on the value of an applied bias voltage V or voltages (V_1, V_2, ...). A change in bias values would change the impedances and, consequently, the antenna properties of the element would change. This means that the embedded element gain and the active reflection coefficient become functions of V or (V_1, V_2, ...) as well as θ. That is, these factors in Expression (1) above can be expressed as $g(\theta, V_1, V_2, \ldots)$ and $\Gamma(\theta, V_1, V_2, \ldots)$. This disclosure teaches that it is possible to design reconfigurable elements so that the coverage of the array can be expanded considerably by varying the state of the elements.